

# SCIENCE NEWS-LETTER

*The Weekly Summary of Current Science*  
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January 25, 1930



## MAIZE GOD OF THE MAYANS

*Would He Be a Leading Deity in America Today if—*

*(See page 52)*

Vol. XVII

No. 459

# Electron Bullets Deadly to Germs

Medicine

**E**LECTRONIC bullets, fired with electricity as low as thirty volts, which can be obtained from a battery of twenty dry cells, are capable of killing at least one common form of germ. In a study made at the University of Cincinnati, Dr. D. A. Wells has found that *Staphylococcus albus*, the mildest of several germs that produce boils, are destroyed by these relatively low speed electrons, moving at speeds of a few miles a second. High speed electrons driven by voltages of several thousand, have already been observed to have a germ-killing effect.

Modern theories suggest that electrons are similar to forms of radiation like the ultraviolet rays, which also kill germs. To help find how this happens, Dr. Wells began the work on the electrons.

The germs must be rayed in a vacuum tube, but those used in the experiment could be kept for eight hours in a vacuum one fifteen millionth the density of ordinary air without killing them. When bombarded with electrons of 30 volts energy they were quickly killed, but with lower voltages they survived. The more energy in the electrons, the more germs were killed.

## Asthma

**A**STRANGE case of asthma, in which the patient suffered severe attacks when he was in a musty atmosphere, such as is found in damp old houses, musty store rooms or trunk rooms, antique shops and the like, has been reported to the American Medical Association by Dr. J. G. Hopkins, Dr. Beatrice M. Kesten and Rhoda W. Benham of the Columbia

University College of Physicians and Surgeons.

The cause of the asthmatic attacks was finally discovered to be a certain kind of fungus. This fungus was found in the air of certain rooms and houses in which the patient had had attacks, and caused the mustiness of the atmosphere which the patient had associated with his attacks.

## How Many Sick?

**T**ELLING how many people in the country are sick is a public health problem in statistics that is not yet solved, Dr. Edwin B. Wilson of the Harvard School of Public Health has reported to the National Academy of Sciences.

Since, as Dr. Wilson observed, "a person dies but once," death rates are obtained with fair accuracy. On the other hand sickness rates or morbidity are complicated not alone by the failure of the physicians to report cases but by the way the statistical facts are handled.

Reports of cases of sickness come to health departments daily or weekly, but these reports do not furnish a very reliable basis for analysis of the amount and kind of sickness actually occurring in the country. To begin with the reports are not complete and they do not take into account the duration of the sickness.

"A person dies at an instant," Dr. Wilson said, but he explained that the dividing line in point of time between health and the onset of sickness is not nearly so sharp as that between life

and death. Yet we use the same unit period of time for our calculations of mortality rates and of morbidity rates. Dr. Wilson suggested that morbidity rates and new-case rates be sharply distinguished.

That cancer causes a person to be sick over a longer period than typhoid fever and other such diseases is often ignored. Dr. Wilson urged statisticians to provide for duration of disease in applying their figures.

He pointed out that if death rates and findings at autopsies are properly considered in relation to the whole population it will be possible to have a truer picture of how disease affects everyday life.

## Parrot Fever

**P**ARROT fever is "essentially a medical curiosity and need occasion little alarm among the people of the United States," the Journal of the American Medical Association commented in its last issue.

"The development of cases at widely separated points suggests anew the reflection that it is no longer possible for any person or any nation to live in isolation," the comment continued. "The possibility of unusual disorders must be ever present in the medical mind."

Discussing the disease itself, the Journal said:

"The disease is attributed to an organism called *Bacillus psittacosis*, or *Bacillus aertrycke*, but there is doubt whether this organism is the real cause of pneumonia transmitted to man by parrots. Some investigators, Jordan says, attribute it to a special variety of streptococcus. *Bacillus psittacosis* closely resembles *Bacillus paratyphosus*, *Bacillus suispestifer* and the bacillus of mouse typhoid (*B. typhi-murium*). Since the symptoms resemble those of other infectious disorders, identification of the disease rests on isolation of the specific organism from both the patient and the suspected parrot."

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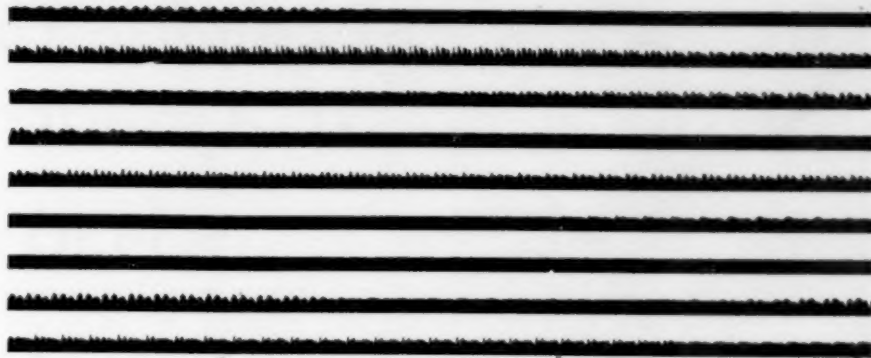
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How sound is recorded in the film phonograph. The nine sound tracks reproduce the original sound waves, and when this film is run through the reproducer, a facsimile of the original sound results. The film is here shown about three times its actual size.



# Film Phonograph Plays for 2 Hours

Engineering

## Child of the Talkies Heralds Home Entertainer of Future

**B**ORN of the talkies, a film phonograph capable of playing continuously for two hours from a 400-foot reel of motion picture sound film has been perfected by Dr. C. H. Hewlett, engineer of the General Electric Company. From a reel of film small enough to fit into a coat pocket a complete play or opera can be reproduced, which otherwise would require 15 to 20 ordinary 12-inch disc records.

Talking motion picture technique allowed Dr. Hewlett to achieve his result. In one of the principal methods of recording sound for the talkies, a jagged line photographed on the edge of the film is the representation of the sound. Light passes through a narrow slit, through the film onto a photoelectric tube. As the teeth of the jagged lines pass by the slit, they vary the amount of light reaching the tube, which in turn varies the intensity of an electric current. When this current is amplified and fed into a loud speaker, a reproduction of the original sound emerges.

Dr. Hewlett's film phonograph record has no sequence of photographs and contains only sound records. It lacks the perforations of ordinary motion picture film. At present there is space for nine separate sound tracks side by side, but he hopes soon to increase its capacity to fifteen. When the film has run through once it is necessary to shift to the next sound track. In the early models this was done by recording the second track backwards, and reversing and shifting when the end was reached. The third track ran forward again, and the operation was repeated until the film ended.

Now, however, a continuous loop

of film is used, unwinding from the inside as it winds up on the outside, after the fashion of automatic movie machines used for window displays. When a track ends, the machine shifts automatically to the next in a fraction of a second, with practically no interruption of sound. With this system and nine tracks, a program lasting an hour and twenty minutes can be played without attention. With fifteen tracks the machine will play for over two hours.

Recording is done through the same kind of microphone as used in radio or ordinary record studios. The light from a 50-watt incandescent lamp passes over a straight edge close to the lamp, and is focussed on a small mirror made to vibrate electrically in step with the sound waves. The edge is reflected upon a small slit, so that, as the mirror oscillates, the light shining through varies. A microscope lens focusses this slit on the film one tenth its actual size, and as the film moves along, the jagged line is photographed.

Positive film, slower and less "grainy" than the negative film for talking movies, is the material used in the film phonograph. The "grain" is made of the small clumps of silver molecules that form the black parts of a photograph, either negative or positive, and its size sets the limit to the length of the program that can be recorded on a given strip of film. If these clumps reach a size approaching that of the teeth on the sound record, they also affect the photoelectric tube and cause distorted reproduction.

If the grains can be reduced in size, then the sound wave can also be reduced; the film in turn can be run more slowly and a longer program can

be recorded on the same length of film. Dr. Hewlett runs his film through the recorder and the reproducer at a speed of 45 feet per minute, half the speed of talking motion picture film. Ordinary silent movies are projected at 60 feet per minute.

When it is necessary to make extra copies of the film record, prints can be made on other films in the same way that prints of motion picture films are made from the negatives exposed in the camera. However, for the purpose of reproduction, printing is not necessary. The original negative record, when run through the reproducer, will yield exactly the same sounds as a positive print. This is because the sound depends upon the variations of the light reaching the photoelectric tube. These are the same regardless of whether the record is a black line with a white background, or white line against a black background. The pitch of the sound is regulated by the distance between the peaks of the jagged line, while the volume depends on the height of the peaks.

The other means of recording sound on film is by the variable density method. A light, made to vary in accord with the voice or sounds to be recorded, shines on a narrow slit, in back of which runs the film. This results in a line of constant width, but varying density and can be reproduced in the same machine that is used for the variable width method, such as Dr. Hewlett has applied.

So far, no plans have been announced for the commercial exploitation of the film phonograph.

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# What Would Have Happened— If America Had Not Been Discovered

*Archaeology*

By Emily C. Davis

Like the art of Middle America is this figure carved in a copper plate. But it was found in the prehistoric Indian mound settlement at Etowah, Ga.

**S**UPPOSE Columbus had not kissed the Queen's hand and sailed. Suppose America had never in the centuries since been discovered by white men. Just suppose.

Let the archaeologists, inquisitive of past racial glories, guess at what might have happened in a twentieth century redman's world.

Civilization might now be centered in the Iroquois, one of the barbarian groups far northward of the centers of culture that arose in the tropics long before invasion of the conquering whites.

Prehistoric America had Indian tribes which may be compared to the intellectual, artistic Greeks. It had powerful, aggressive tribes like the conquering Romans. And it had cruder tribes to the north like the barbarian tribes of northern Europe.

The drama in which these Indian groups were playing their roles was cut short when the white men came adventuring and conquering into the New World. Consequently, the third act of the great American drama will never be completed, except in imagination by those who like to speculate as to what would have happened if Columbus and De Soto and the rest had delayed their coming, thus leaving a longer chance for the Indians to work out America's destiny.

Until now, it has scarcely been worth while to speculate, because there were few clues to the migrations and trends of the American tribes. But knowledge of prehistoric

America is advancing steadily as a result of excavations into old Indian sites and explorations into unpenetrated regions of the continent. It begins to be possible to piece together some of the clues, so as to reconstruct the early acts of the drama and even to guess at a plausible ending.

The suggestion that ancient America appears to parallel ancient Europe rather remarkably was made recently by Dr. A. V. Kidder, archaeologist of Phillips Academy, Andover, and director of archaeological researches for the Carnegie Institute of Washington. Dr. Kidder pointed out that the Mayan Indians who lived in Central America and Yucatan developed there a culture which was the finest in America, very much as the Greek was the highest culture of Europe.

These Mayas, starting as a primitive group, several thousand years before Christ, established the foundations of a resplendent civilization. By the first century A. D. they were building impressive stone temples and government buildings, around which the thatched huts of the people spread out in great cities. Indian artists adorned the white limestone and stucco buildings with beautiful exotic sculptures and paintings, and engineers built wide stone highways, probably for ceremonial use, leading to important places of worship.

Their scientists were clever enough as astronomers and mathematicians to devise a calendar system better than

the Roman calendar, and almost as precise as our own at present. Their scholars worked out a system of writing in pictures and symbols, so that dates and other important records could be painted or carved. Squads of workmen, who probably could not read the learned writing were kept busy cutting dates into tall stone monuments, for the Mayas believed strongly in keeping permanent records of time. All this was done without any imported assistance from Europe, Asia, or North Africa, where nations climbed up on one another's shoulders and profited heavily by one another's inventions.

North of the Mayas, in the highlands of Mexico, were other Indian groups who built fine stone cities, and among these Dr. Kidder singles out the Aztecs, whom he compares to the Romans. About the time of the Middle Ages in Europe, the Greek-like Mayas had risen to the heights of their glory and had begun to degenerate, while the Aztecs were absorbing from the luckless Mayas much of their hard-won culture, as the Romans borrowed Greek art and elegance. There was less aesthetic sense among the fighting Aztecs than among the Mayas, but they enjoyed luxury and display.

When the Spaniards came to Mexico in the sixteenth century, the Aztecs were the most impressive masters of the land, who met Cortez, and who were soon reduced to the status of laborers, forced to fill bottomless coffers with gold for the Spanish treasury. The Spaniards burned Aztec books, destroyed temples, silenced forever priests and scholars who alone held the keys to the learning that had been amassed through so many cen-

turies. And this is somewhat as if the ancient Roman civilization had been cut off sharply at the close of the Republican period, Dr. Kidder has suggested.

The parallel is that republican Rome succeeded in conquering provinces and multiplying its slaves and prisoners, but the vanquished people were not brought into the Roman organization as self-respecting colonials until the founding of the Empire. So, the Aztecs had extended their sway over many neighboring Indian tribes in Mexico, but they had not made the subjugated people a part of a unified empire when their progress was cut off. If they had organized their subjects, they might have presented so powerful an attack before the comparatively small band of Spanish adventurers that the invaders would have fled discouraged. As it was, however, the Spaniards found it easy enough to make allies of the tribes who hated their Aztec masters. Had Rome been interrupted in her program of colonization and empire-building at such a point, the course of world history would have been different. The Aztecs were interrupted.

The parallel between what happened in Europe and what seems to have been happening in America may be carried further. In Europe, the course of migration and the spread of knowledge and conquest turned northward, from the centers of civilization in the Mediterranean country to the barbarian lands of Gaul and Britain. The simpler northern tribes of Europe took over as much of the

knowledge of the declining Greek and Roman world as they could assimilate. They held the heritage and transmitted it. In America, the picture is not so clear, but Dr. Kidder and some other archaeologists incline to the opinion that the same northward wave of culture was under way in the New World. The theory implies that the people who are the central stock of a civilization pass on many of the ideas they develop to the people who are living off on the fringes of the civilization. When the central civilization fails, the fringe people are able to preserve the inventions and the knowledge of the decadent race without being in such close contact with them as to become infected by their physical or moral downfall.

There is evidence that some of the ideas from tropical America did spread northward. This does not mean that the Mayas or the Aztecs ever conducted a campaign of conquest among the distant "barbarians" as the Romans did. Nor does it mean that missionary Indians from the tropics travelled up into the Mississippi Valley to teach the mound-building tribes how to record time or how to build securely in stone. If Mayan groups worked their way north, it was probably at some early time when the Mayas themselves were only groping toward progress. But what is more certain is that in the days of Mayan and Aztec glory there were traders who came up from the South bringing goods for exchange.

There was an impressive amount of this trading up and down and across the wilderness of the Americas. Indian mounds in the Mississippi Valley, for example, have yielded articles made of materials that must have come from hundreds, even thousands of miles distant. When we know that mound builder chiefs in Ohio wore beads made of marine shells from the gulf region, breastplates made of copper from the Great Lakes country, obsidian knife blades from the Rockies, glittery decorations of mica from the Appalachian highlands, it is plausible enough to assume that Mexican ideas and goods would be carried abroad.

Evidence of the Mexican trade in northern America is to be seen only in obscure, fragmentary glimpses. But these clues are increasing and overlapping so that they can scarcely be ignored. Considering the clues, Henry B. Collins, Jr., of the U. S. National Museum, agrees with Dr. Kidder's theory that the prehistoric north bor-

rowed rather heavily from the more advanced south.

Mr. Collins has found in the Indian mounds of Louisiana ear-plugs which surely owe their inspiration to the jewelry of the Mayas or Aztecs, if the plugs themselves were not imported from the Aztec country. These ear-plugs are of stone, copper-coated, and made like big collar buttons. They are the typical sort of ear ornament worn by chiefs and priests in countless carvings and paintings in the old tropical cities. The same fashion in earrings spread to Ohio, and to mound-building tribes of other states.

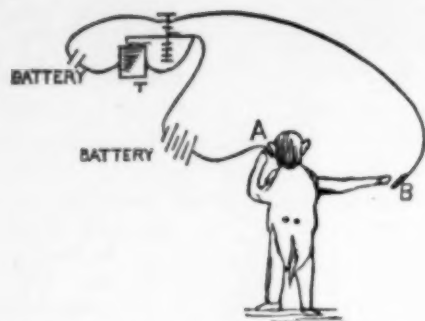
In the Indian mound settlement at Etowah, Georgia, have been found mysterious copper plates decorated with human figures too much like the art of Middle America for the resemblance to be ignored. They are a puzzle, but they fit into a picture of the northward spread of American culture. On the copper plates are engraved the figures of warriors or chiefs wearing costumes such as Aztec or Mayan dignitaries would wear, and the whole design is too reminiscent of the southern art for the resemblance to be accidental.

In the southeastern states have been found pottery and shell objects decorated with rattlesnakes wearing horns or feathers on their heads. Now, there were snakes aplenty in the woodlands of the states, but serpents were not commonly represented in Indian art north of Mexico. To represent this particular kind of snake with this unusual headdress on pottery implies almost surely that the thought was borrowed from Mexico, where the Feathered Serpent was a favorite deity. The Snake Dance of the Southwest is another possible link in the chain of evidence regarding the spread of the serpent cult northward from its base.

There is a link between Mexico and the states still more fundamental, Mr. Collins suggests, and that is the mounds themselves. Through two-thirds of the United States are scattered thousands of earthen hills piled up many centuries ago by Indians who wished to erect burial hills for honored dead, or who wished to make high foundations for their wooden temples or lookouts. In America the mound-building custom would reasonably appear to have had a single origin and to have spread from that. In Middle America, the Mayas and perhaps their primitive ancestors began building great stone mounds or pyramids, and on these (Turn to page 62)



Did Ohio Indians, like the Mexicans, venerate the serpent? They built this strange mound with an egg-shaped altar at the snake's mouth in Ohio. It is 1,254 feet long.



This drawing by Alexander Graham Bell illustrated a letter to his family in May, 1875, describing an experiment which was one of the starting points in his experiments with electrically generated sound.

*THE BELL TELEPHONE. The Deposition of Alexander Graham Bell in the suit brought by the United States to annul the Bell Patents (1887-1896). Printed by the Bell Telephone Company, Boston, 1908.*

SALEM, MASS., JULY 1st, 1875.

DEAR MR. HUBBARD:  
The experiment to which I alluded when I saw you last promises to be a grand success. On singing this afternoon in front of a stretched membrane attached to the armature of an electro-magnet, the varying pitch of the voice was plainly perceptible at the other end of the line, no battery nor permanent magnet being employed. When the vibrations are received upon another stretched membrane in place of a steel spring, it is possible, nay, it is probable, that the "timbre" of the sound will be perceived. I hope to try the experiment tomorrow afternoon. . .

With kind regards,

Yours respectfully,  
A. GRAHAM BELL.

*Int. 82.* Will you describe the instruments with which such experiment was tried, beginning with the one of earlier construction, and ending with that of later construction?

*Ans.* I have here some drawings, one showing the first instrument in perspective, and the other showing it in cross-section, by the aid of which I will make my description.

In this earlier arrangement, a membrane M is attached to a straining ring R, carrying three metallic projections, through which screws S pass into a board F. By the operation of screws S the membrane M can be stretched tightly across the end of a tube T. Attached to the board F are side-pieces U, U, carrying a cross-bar B, which is retained in position in the

# The Telephone

## —A Classic Invention

*Electricity*

The dramatic fact that Bell's patent application on the speaking telephone was filed two hours before Gray's caveat on a musical telegraph has been much discussed. The correspondence between the rival inventors, if occasionally emphatic, is dignified and courteous. Some of their friends became more controversial, as when the Chicago Tribune, championing Gray, declared: "Talking by telegraph and other sport of that description Mr. Gray has not paid much attention to as yet, because there is no present indication in it of anything more than sport."

Using the description and diagrams below, you can reconstruct Bell's first speaking telephone and enjoy the sport of telephony, 1875 style.

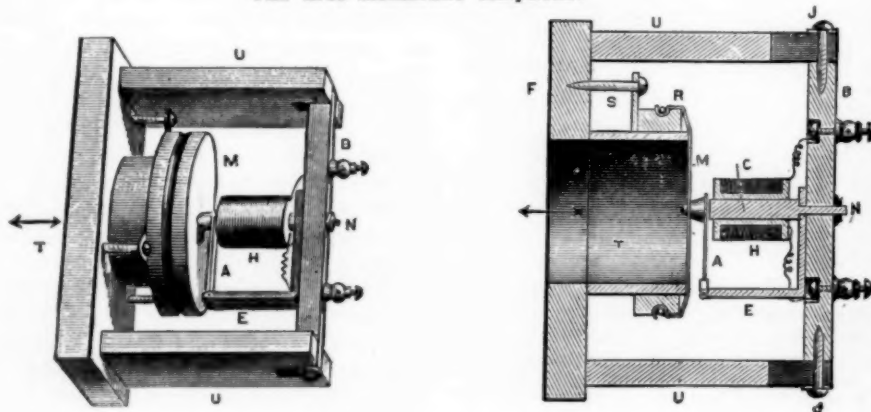
slotted ends of the side-pieces by screws J, J. The cross-bar B supports an electro-magnet H, E, which is attached to the cross-bar by a screw and nut at N. The leg C of the electro-magnet is covered with a coil H of insulated copper wire, and to the uncovered leg E of the electro-magnet is pivoted one end of the steel armature A, the other end being attached to the center of the strained membrane M. I am not sure at the present moment, how the attachment of the membrane was made, but I think the drawing shows a piece of cork between the center of the membrane and the end of the armature or reed. On the other side of the membrane is a metallic washer, through which passes a screw, clamping the membrane between the washer and the cork. I think this is the arrangement shown in the diagram. At all events, we used such an arrangement in some of our experiments in June or July, 1875. If I remember rightly, we did not at first adjust the electro-magnet, in the earlier instrument, by changing the position of the cross-bar; but we did so by means of the screw and nut shown at N. By unscrewing the nut a little, we could cause the electro-

magnet to approach its armature more closely and retain this position by means of washers or thin pieces of metal placed between the cross-bar and the heel-piece of the electro-magnet. This was the first method, I think, of adjusting the position of the electro-magnet; and then came the plan of fixing it firmly to the cross-bar, and adjusting the position of the cross-bar by the screws J, J. It may be perfectly possible that the cross-bar means of adjustment existed in the apparatus before the experiment was made, described in the letter of July 1. I cannot be sure now at this date.

I will now describe the second instrument, and will do so by the aid of the following drawings:

Comparing these drawings with the drawings of the earlier instrument given above, like parts are indicated by the same letters. I will simply point out the differences. In the second instrument, the straining ring R carried a circular flange, through which three screws passed, adjusting its distance from the board F. The tube T was much shorter than in the earlier instrument, so that the flange of the straining ring R came much closer to

The first membrane telephone.

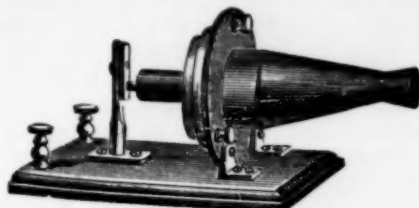




the board F. The electro-magnet H, E was attached firmly to the cross-bar B by a screw passing through a washer at O, and the distance of the pole of the electro-magnet from its armature A was regulated by adjusting the position of the cross-bar B by means of the screws J, J. The steel-spring armature A was attached to the uncovered pole E of the electro-magnet by means of a leather hinge, and the end of the pole itself was filed to an edge which was intended to be in contact with the end of the armature A. The other end of the armature A carried a metallic pin, and a screw passing through the center of the membrane into the metallic pin clamped the membrane firmly between two metallic washers.

*Int. 84.* Please, now, describe the trial which you made of these two instruments which you have described in your answer to Interrogatory 82, and state the results which you obtained from such trial, early in July, 1875.

*Ans.* One of these instruments was placed in a room in the upper part of Mr. Williams's building, 109 Court Street, Boston, and the other in one of the work-rooms below. The two instruments were connected together in metallic circuit, but I do not remember at the present moment whether a battery was used in the first experiment, or not. I spoke and shouted and sang—with my mouth as close to the membrane as possible—into the instrument upstairs, while Mr. Watson listened to the instrument downstairs. I remember that while I was talking or singing to the instrument upstairs, I was interrupted by the sudden appearance of Mr. Watson, who had rushed upstairs in great excitement, to tell me what he had observed below. I remember that he told me he could hear my voice quite plain-



**Bell's Speaking Telephone shown at the Centennial Exposition, Philadelphia, 1876.**

ly, and could almost make out what I said. I then asked Mr. Watson to do the speaking, but was myself unable to verify his assertion. We made a number of experiments at the time, changing places so that one should be upstairs and the other down. I do not remember the details of these experiments, nor exactly the results obtained, excepting that speech sounds were unmistakably produced from the receiver, and were almost intelligible, and that Mr. Watson appeared to hear a good deal more than I was able to do. While I am free to say that the character of the articulation produced was rather disappointing, the fact that any sound at all was audible, under the circumstances of the experiment, convinced me that the supposed difficulty which had been in my mind since the summer of 1874—namely, that magneto-electric impulses generated by the action of the voice would be too feeble to produce distinctly audible effects—was a mistake, and the results encouraged me to believe that the apparatus, if carefully constructed, and tried in a quiet place, would transmit speech intelligibly, and prove to be a practically operative speaking telephone.

*Int. 86.* Did you subsequently make trial of just such instruments as your two membrane telephones which you have described in answer to Interrogatory 82, in a more quiet place,

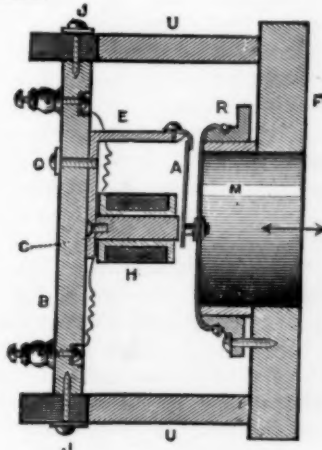
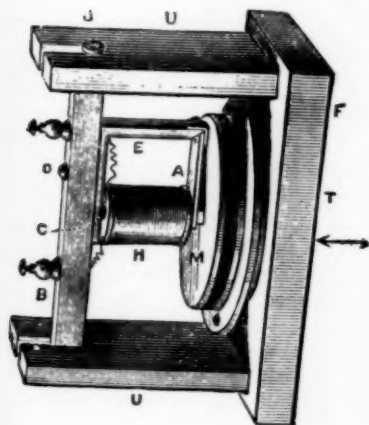
and compare the results obtained, with their trial in the same situation as when the originals were first tried; and if so, when, and what did you find their capacity to be?

*Ans.* Yes. I made experiments with membrane telephones that were substantially reproductions of the instruments used in the summer of 1875. I am not sure about the date, but think it may have been about 1879. The instruments were tried in Mr. Williams's establishment in about the same places occupied by the original instruments in 1875. I think it was Mr. Watson who made the experiments with me, but cannot be quite sure. I remember that, under such circumstances, I could hear the sound of the voice, but could not make out the articulation. The instruments were then carried off to some quiet place—and here again my memory fails me. I am inclined to think that they were taken either to some office on State Street, or some place on Milk Street; but at all events, I remember that it was some place of a quiet character, where there was no noisy machinery at work to distract the attention. The instruments were set up just as they had been immediately before at Mr. Williams's establishments, and I was able to carry on a conversation with the person at the other end—at least, that is my recollection. I am perfectly sure of so much—that I heard and understood speech through the instruments in this quiet place, where I could not understand anything in the noisy shop of Mr. Williams. I remember, also—during the course of the experiments in the quiet place, a fire-alarm struck, or some noise occurred outside, in which there was ringing of bells, etc., and that while the noise lasted I could not make out what was said by the telephone, but when the noise ceased, I was able to understand again.

*Int. 87.* In what position were the membrane telephone instruments, described in your answer to Interrogatory 82 intended to be held when used; and how did you, in fact, hold them and their duplicates, when subsequently tried, when experimenting with them?

*Ans.* The position in which the membrane telephones were held was not material. In the experiments referred to I took the telephone up in my hand, and simply tried to get my mouth or ear, as the case might be, as close to the membrane as possible. In doing this I (Turn to page 58)

**The second membrane telephone.**



## Cooling Fluid

Automobile and airplane engines run most efficiently at a temperature which would instantly boil away their cooling water, Gerhardt W. Frank, air corps engineer at Wright Field, has found.

Using ethylene glycol as the cooling liquid, Mr. Frank found that a temperature of 285 degrees Fahrenheit was reached in a full throttle test on an airplane engine. Water, commonly used as the cooling agent, would have boiled away at 212 degrees. Ethylene glycol, which is sold as an auto anti-freeze solution, boils at 387 degrees.

A power loss of three per cent. caused by the high temperature was more than compensated for by a better fuel economy and reduction of radiator size, cooling liquid required, engine weight and wind resistance.

*Engineering*

*Science News-Letter, January 25, 1930*

## Honored

Dr. J. S. Plaskett, director of the Dominion Astrophysical Observatory at Victoria, B. C., is to be awarded the gold medal of the Royal Astronomical Society, it was announced before the society's meeting in London. Given annually to some outstanding astronomer, the medal represents one of the highest honors that can come to a student of the stars.

The citation is to Dr. Plaskett "for his valuable observations of stellar radial velocities, and the important conclusions derived from them."

Dr. Plaskett was placed in charge of the work in astrophysics at the Dominion Observatory, Ottawa, when that institution was founded in 1905. With a 15-inch refracting telescope, he began determinations of the radial velocities of stars, that is, their motions toward or away from the earth. This is done by studying the amount of the minute displacements of the dark lines that appear in their spectra when their light is analyzed with the spectroscope.

As the 15-inch telescope was too small for the best results in this work, the Canadian Government ordered a 72-inch reflecting telescope, which was built in the United States and completed in 1918. Then it was the world's largest telescope, but about a year later the 100-inch at Mt. Wilson, California, was completed, taking the honor, which it still holds. The 72-inch was installed at a new observatory at Victoria, and Dr. Plaskett was made director.

In the first series of stars studied

with this instrument, about 200 previously unknown double stars were revealed by the spectroscope. A second series of 1500 stars is still being observed, though several other researches are under way besides the measurements of the stars' radial velocities.

The Royal Astronomical Society has also selected Dr. Plaskett to give the George Darwin lecture a little later in the year. The lecture is given annually in memory of Sir George Darwin, famous astronomer and second son of Charles Darwin.

*Astronomy*

*Science News-Letter, January 25, 1930*

## Sue for Noise

The day may not be far distant when real estate owners will recover at law for damages caused by clanking street cars or pounding trucks and busses, predicts Stephen E. Slocum, prominent consulting engineer, in a recent issue of the *Engineering News-Record*.

Legal proceedings have been successful against the smoke nuisance, Mr. Slocum points out; why not against the noise nuisance?

In big cities, noise, or vibration, has increased to such an extent that not only are tall buildings endangered, but the health and sanity of the people are menaced, he says.

*Engineering*

*Science News-Letter, January 25, 1930*

## Manna

The manna which the children of Israel ate during their sojourn in the Sinai wilderness was the sap of a desert shrub, the tamarix, drawn off and predigested by insects and dried to hardness in the desert air.

The vexed question of just what was their food, which seemed miraculous to the hungry refugees from Pharaoh's wrath, has been investigated by a special expedition sent out by the Hebrew University of Jerusalem, under the leadership of Dr. F. S. Bodenheimer and Dr. O. Theodor. A brief report of their results has been sent to *Nature*.

There has always been a dispute among scholars as to whether manna was an edible lichen, a low form of plant life that grows on the desert soil of the Sinai region, or whether it was the hardened sweet sap of the tamarix shrub. The studies of the expedition established that it is the same thing known elsewhere as "honey-dew"—the sap of the plant drawn off by aphids and exuded from their bodies. It is produced by one

# IN VARIOUS C

or two species of aphids on a single species of tamarix in sufficient quantity to form large drops that harden into sweetish grains of solid substance. Chemical analysis showed that it contains three varieties of sugar, as well as other compounds.

The honey-dew that turns into manna is formed from the downward current of sap that bears the food substances made in the leaves toward the roots of the plant. The investigators proved this by ringing the bark of branches on which the aphids were feeding. When the bark was ringed below them they kept on producing manna as though nothing had happened. But when the ring was cut above them, stopping the downward food bearing sap flow, the manna production also stopped.

*Botany*

*Science News-Letter, January 25, 1930*

## Rain

It rained in practically every state in the Union one day recently. The Daily Weather map for Jan. 14 is shaded from the Atlantic to the Pacific and from Canada to Mexico and the Gulf.

Although as little as one one-hundredth of an inch precipitation is reported, it is very unusual for rain to fall in every state during 24 hours, the U. S. Weather Bureau says.

*Meteorology*

*Science News-Letter, January 25, 1930*

## Light Control

A flashing beam of light, reflected back to a locomotive from a mirror on the signal post, is the latest protection for railways. The new device is being tried out over a stretch of several hundred miles of the German State Railways, between Berlin and Munich.

From a small searchlight on the front of the locomotive a narrow beam of light is thrown upwards all the time the locomotive is in operation. A ring of light sensitive cells are located around the searchlight lens. When the train comes to a signal post, the mirror on the post reflects the light back to one of the cells. This starts an electric current, which makes a visible signal in the engine cab, and remains until the engineer acts on it, or, if he does not respond promptly, the train is stopped automatically. Movement of



## SCIENCE FIELDS

the mirror on the post determines which cell receives the reflected light, and the signal given the engineer.

In order that the wrong signal will not be given by some stray light beam, the light of the searchlight is interrupted 600 times a second by a rotating shutter, and the cells are adjusted to respond only to light of this frequency.

The great advantage claimed for this system over previous methods of automatic train control is the simplicity of the apparatus on the track. Previous electrical methods have required an elaborate system of wires and machinery on the track, which were troublesome and expensive to keep in order. In the new method all the complicated apparatus is right on the locomotive where it can be adjusted and repaired in the round house.

*Physics—Engineering*

*Science News-Letter, January 25, 1930*

### Mechanical Congress

The fundamental principles underlying propulsion, airplane flight, plasticity, strength of materials, and acoustics will be considered by scientists and technologists from all parts of the world when the Third International Congress for Applied Mechanics meets at Stockholm August 24 to 29. The leading Swedish scientific institutions, including the Royal Technical University, will be hosts to the visiting delegates.

*Mechanics*

*Science News-Letter, January 25, 1930*

### Exit Floorwalker

The kind of a person who makes the most satisfactory store floor walker, or, as the position is now more impressively called "section manager," has been investigated by Dr. C. J. Ho, New York specialist in industrial psychology.

The section manager who has succeeded the old-fashioned floor walker has become so important a person that one department store in New York gets out a 70-page manual for the guidance of its section managers in their duties. These employees not only have to deal with customers in adjusting complaints and exchanges of goods, but must also be responsible for the discipline of salesclerks.

After analyzing the personalities and records of more than 100 section

managers in a single New York department store, Dr. Ho has concluded that an individual who makes good in this important position must be lively, aggressive, responsive, alert, and pleasant.

"Married men from 30 to 45 years of age and single women from 25 to 35 have the best chance for success in the section manager job," Dr. Ho stated in reporting his investigation in the forthcoming issue of the *Personnel Journal*. "Men should have at least two years of college education, and intelligence a little above the average. Women with high-school education and average intelligence may succeed if they have other good qualities."

Both men and women should be free from any personality difficulties of their own, which would make them nervous and irritable, Dr. Ho emphasizes. They will also need a convincing manner, initiative, good appearance, and an attitude of interest for success.

*Employment Psychology*

*Science News-Letter, January 25, 1930*

### Memorial

An engineering memorial to George Washington, the engineer, which would include the restoration of canal locks at Great Falls on the Potomac; is being sought by the American Engineering Council.

It is proposed to complete the reconstruction by 1932 when the George Washington bi-centennial will be held.

Washington's canal at Great Falls, a few miles west of Washington, is remarkable when the crude machinery he had to work with is considered. The canal on the Virginia side of the river is cut through rock for a distance of 40 feet at the lower end. As first laid out it consisted of five locks which took care of a 76-foot fall.

*Engineering—History*

*Science News-Letter, January 25, 1930*

### New Value

A new value for the "charge of the electron," one of the most fundamental of physical quantities, has just been announced by Prof. A. S. Eddington in *Nature*. About a year ago Prof. Eddington, who is Pluianian professor of astronomy at Cambridge University, announced calculations made from theoretical considerations, showing the value to be 136. He now announces that his further study has shown the theoretical value to be 137. This brings it more nearly in accord with the classical experimental determination of the value by Dr. R. A. Millikan, American physicist and Nobel prizeman, who found it to be 137.1.

*Physics*

*Science News-Letter, January 25, 1930*

### Custer Veterans

Indian survivors of Custer's battle on the Little Big Horn have been found among a band of Wapeton Sioux in central Saskatchewan by an expedition from the Cambridge University Museum and the British Museum.

The expedition, led by an American, Donald A. Cadzow, has just returned to civilization after traveling thousands of miles to study scattered tribes of Canadian Indians whose old native culture is fast vanishing. Mr. Cadzow has been accompanied by Robert Rymill of England and John Rymill of South Australia.

The band containing the Custer fight survivors moved to Canada shortly after the battle, Mr. Cadzow said. The group fought its way northward to good hunting country on the north shore of the Saskatchewan river and there it settled. The old chief, Four Stars, is still alive, and they all call Americans "Che-moki-men" or "Long-knives," after the name long ago given to American cavalry men who carried sabers.

In northeast Saskatchewan the expedition found an untamed tribe of Salteaux Indians, led by a blind old chief named Nippy, and independently hating everything that suggests the white man's America.

"These Indians live as their ancestors did a hundred years ago, hunting moose, deer, and fish," Mr. Cadzow said. "Repeated efforts by the government to keep these long-haired pagans on a reservation have failed. They refuse to accept treaty money offered to them each year by the Indian Department, and missionaries sent to them by various faiths have given up all hope of converting them because it is impossible to work with a roving band of hunters who refuse even to talk with a white man."

Many of the ancient secret societies still function among the tribes, the expedition found. The Piegan Indians of Alberta hold their annual Sundance, but the torture of warriors by placing sharpened sticks through the flesh of their breasts is omitted, because it is no longer necessary to make warriors.

"The weird throb of the tom-tom played by medicine men and herb doctors can still be heard on the reserves," Mr. Cadzow stated. "But it is only a matter of a few years before the white man's civilization will wipe out the last vestige of true Indian culture."

*Anthropology*

*Science News-Letter, January 25, 1930*

# Ancient Myth Had Basis in Fact

Archaeology

## Tomb of "Dwellers Behind North Winds" Found

THE ancient Greeks were not dealing entirely in myths when they talked about the Land of the Hyperboreans, the dwellers behind the north winds. The latest discoveries by Prof. Peter Kozlov, famous Russian explorer, reveal that the Greeks were right in accepting rumors of a cultured race far to the north of their little world.

Prof. Kozlov, who has been excavating at an ancient burying ground in the mountain passes of northern Mongolia, has just sent back word to civilization that he has entered the tomb of an Asiatic person of rank who lived in eastern luxury more than 2,000 years ago. The expedition has placed special hopes on the mound containing this tomb, because the conditions of getting into it were so discouraging that it must have been thief-proof through the centuries.

The tumulus, or mound, was dub-

bed by the excavators the "wet tumulus" because of the water in it. Starting last summer, the expedition set four pumps working day and night to pump it dry. When this attack failed, they waited until winter brought heavy frost, and now scientific persistence has won. Out of the tomb the workers brought jade, tapestry, a carpet adorned with hieroglyphs, little carved figurines of dragons, lynxes, and spotted deer, and other beautiful things.

"It is astonishing to find articles of wood, leather stuff, not to mention carpets and human hair, in good preservation deep underground for a period of two thousand and more years," Prof. Kozlov stated. "The explanation is to be found in the even, low temperature from zero to one degree, which at a depth of a few sazhen has not changed for centuries, thus preserving even fine fabrics."

The explorer explained that his chief interest in the Mongolian sepulchres is to use them to shed light on the remote history of the region. Some of the buried objects show that Greek ideas spread to this distant heart of Asia. In the course of this relayed spreading of Greek objects and Greek styles in art, doubtless came the return wave of rumors as to the strange land beyond the north winds. Other objects from the Mongolian tombs show that the fine old culture of China influenced the lives of the people of this tribe.

Prof. Kozlov explains that according to Chinese scholars, the European Huns of the fourth century B. C. were in touch with the Hun-Hu people, who were wanderers living to the north of the Chinese. These Hun-Hu wanderers began to play politics about 200 B. C. when the chieftain was slain by his son, and the son united other nomad tribes and formed the first wandering empire. The Chinese soon discouraged this ambitious project, and tradition says that the Hun-Hu were assimilated by marriages between Hun-Hu princes and Chinese princesses.

"Objects found by us in the sepulchres between Urga and Kiachta confirm these varied influences," Prof. Koslov reported. "Objects bearing the impress of local art lie side by side with those reflecting the time of dynasties two centuries before the dawning of our era."

The ancient burying grounds where the expedition has been working are in the passes of the mountains, among birch and scattered pine trees. About 150 mounds marking graves have been adopted by the expedition, and ten mounds have been excavated. Thieves long ago plundered some of these tombs, but one grave of a woman of high rank had escaped this fate, and still contained rings adorned with rubies, earrings subtly worked in profile of a bull's head, a portrait on a slab of jade, bits of Chinese mirror, and vessels of black Chinese lacquer ornamented in gold.

All articles from the tombs are sent to Leningrad to be cleaned and restored. Many of the articles used 2,000 years ago are so well preserved that they look almost new when restored, Prof. Koslov stated.

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## The Telephone—Continued

do not think I held the instrument in any uniform position, for I feel sure that I spoke with my mouth sometimes on one side of the membrane, and sometimes on the other, and listened in the same way. At all events, the position was immaterial.

SALEM, MASS., AUG. 14th, 1875.

DEAR MR. HUBBARD:

On glancing back over the line of electrical experiments, I recognize that the discovery of the magneto-electric current generated by the vibration of the armature of an electro-magnet in front of one of the poles is the most important point yet reached. I believe that it is the key to still greater things.

The effects produced, though slight in themselves, appear to me so great in proportion to their cause that I feel sure that the future will discover means of utilizing currents obtained in this way on actual telegraph lines.

So important does it seem to me to protect the idea that I think some steps should be taken immediately towards obtaining a Caveat or Patent for the use of a Magneto-Electric Current, whether obtained in the way stated above (by the vibration of permanent magnets in front of electro-

magnets), or in any other way. I should wish to protect it specially as a means of transmitting simultaneously musical notes differing in *intensity* as well as in pitch.

I can see clearly that the magneto-electric current will not only permit of the actual copying of *spoken utterance*, but of the simultaneous transmission of *any number of musical notes* (hence messages) without confusion.

The more I think of it the more I see that the method of making and breaking contact so many times per second is only the *first stage* in the development of the idea.

When we can create a pulsatory action of the current which is the *exact equivalent* of the aerial impulses, we shall certainly obtain exactly similar results. *Any number of sounds* can travel through the air without confusion, and any number should pass along the same wire.

It should even be possible for a number of spoken messages to traverse the same circuit simultaneously, for an attentive ear can distinguish one voice from another, although a number are speaking together.

Yours respectfully,

A. GRAHAM BELL.

Science News-Letter, January 25, 1930



# Signs of Culture Found in Rubbish

Archaeology

## Forerunners of Mayas Were Far From Primitive

**D**IGGING into layers of rubbish at a site beyond the outskirts of Mexico City, Dr. George C. Vaillant, of the American Museum of Natural History, has unearthed traces of some of the forerunners of the great native civilizations of tropical America.

Dr. Vaillant is seeking to understand the evolution of the people who preceded the Toltecs and the Aztecs in central Mexico, and to show the succession of events which led to the flowering of their brilliant and mysterious cultures. Once this record of progress is established, the studies may be extended south to connect with the still more remarkable Mayas, whose scholarly and artistic attainments are one of the wonders of prehistoric America.

From his study of layers of ancient rubbish deposits at Zacatenco, north of Mexico City, Dr. Vaillant is able to show three successive phases of human occupation there, all three of a type hitherto classified in one as Archaic. The site was occupied for many centuries.

"Archaic" man preceded Toltec, Aztec, and Maya, leaving his pottery, figurines, tools, and household objects all over Middle Mexico. The Archaics, far from being as primitive as their name implies, were farmers, weavers, potters, idol makers, stone workers, and builders. But where they came from and under what conditions they evolved these talents is still not known, nor is the manner in which they later merged into the dimly historical Toltec horizon.

The rubbish layers at Zacatenco contain cartloads of broken pottery, many typical figurines in human form, lava corn grinders, clay and stone spindle whorls, and bones of deer. There are balls of polished quartz which must have been hard to make, and for whose use there is no good suggestion. A bit of cloth was found associated with the skeleton of a child, and the imprint of a coil weave basket remained in the earth. Two jade axes, a pendant, and a broken lip or ear ornament are the oldest jade discoveries recorded from a site in Mexico.

In the first period of human occupancy, according to the discoveries of Dr. Vaillant, pottery consisted mainly of thick black clay bowls, and shallow white dishes, and some red ware

roughly painted with geometrical patterns in white. Toward the end of this period, technique improved, but artistic sense remained unborn.

New shapes and improved technique came in with the second period. Dishes grew handles, and there were ladles to eat with. There were imported pottery, clay whistles with animal heads, clay rattles, and crude ornaments.

The third period was apparently the result of a complete revolution. There were entirely new styles in pottery while old ones practically disappeared. Decoration was still crude, but polychrome patterns appeared.

Utilitarian household objects such as lava "metates" or corn grinders, and cooking or storage pots found at Zacatenco showed little variety and changed but slightly, if at all, during the various periods of human occupation there. In fact metates used in modern Mexican kitchens are practically the same as Archaic ones used thousands of years ago. The Indian

servant of an American family living near an ancient lava flow on the outskirts of Mexico City went there and told her mistress that she had at last found the kind of metate she had been looking for.

There was an amazing diversity in the human figurines of clay in the Zacatenco deposits, in every layer. Dr. Vaillant believes them too well made to be toys, and too diverse to be idols of well-defined gods.

Because they reflect so well the changes in style and taste of their ancient makers, Dr. Vaillant is able to show that the third period of human occupation antedates that of the people who lived across the lakes to the south who were later hermetically sealed like laboratory samples under a lava flow.

If there was a still later and fourth phase of life at Zacatenco, its traces may have been lost by the weathering of the earth, because of the nature of the site.

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It is now possible for machine guns and their crews to be dropped from airplanes by means of parachutes and to be ready for firing in a few moments.

The boundary line between Siberia and Alaska is the only definitely established boundary extending to the North Pole.

Is your son or daughter or young friend numbered among 800,000 youthful Americans who will enter high school the first week in February?

The move from grade school to high school, though a small one in time and space, is a momentous step in the life of the individual. New duties and responsibilities are now heaped upon him. New and romantic fields of interest and endeavor spread their kaleidoscopic vistas before him.

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# Congress Considers Jobless and Aged

Sociology

## Legislative Program Deals With Social Problems

OLD persons with no money in the bank and men with frayed shirts and cracked shoes are now bothering Congress. For employment and indigent old age continue to be two important sociological problems before Congress, with indications that steps may be taken before long looking towards solutions, insofar as legislation can solve such questions.

Three bills have been introduced by Senator Robert F. Wagner, Democrat, of New York, which together constitute a program of legislation dealing with the unemployment problem, and which Senator Wagner states are in accordance with recommendations made by the committee on education and labor after an extensive investigation of the subject.

One of these bills would provide for the advance planning in detail of all public projects, including river and harbor works, flood control, public buildings and Federal highways, "so that work on any one or all of these may be accelerated in periods of de-

pression without the necessity of delay for the preparation of plans." There would be available \$150,000,000 annually for such public work, though this amount would not necessarily be used every year.

The second of these bills would scrap the present U. S. employment service, and would create instead a bureau which would coordinate the employment services of the various states and municipalities, and which would act as director in any national functioning of the employment exchanges.

The third bill would greatly expand the statistical work of the Bureau of Labor Statistics. Manufacturing, mining, quarrying, crude petroleum production, building construction, agriculture, lumbering, transportation, and communication labor statistics would be gathered and interpreted in great detail. Retail and wholesale trade labor statistics would also be included in such work.

Senator Wagner's legislative pro-

gram for dealing with the subject of unemployment follows closely upon the heels of a prediction recently made by speakers before the annual conventions of the American Economic Association and the American Statistical Society in Washington, to the effect that unemployment would be the greatest problem in the United States within the next ten years, due to the development of efficient machinery.

France seems to be the only European nation which is not already suffering deeply from this problem, but her ability to keep clear of this particular difficulty has not yet been adequately analyzed.

Germany is said to have 2,000,000 idle workers and Great Britain's minimum has been put at 1,200,000.

In the forthcoming census a larger study of unemployment in this country will be made than ever before in history.

One who is not working when questioned by the census taker will be asked: 1. Do you usually work at a gainful occupation? 2. Do you have a job of any kind? 3. Why were or are you not at work on the last working day on which you would be normally at work? 4. Do you lose a day's pay by not being at work? 5. How many days did you work last week? 6. How many days are there in your full time week?

If the person has no job of any kind, he will be asked: 1. Are you able to work? 2. Are you looking for work? 3. How many weeks have you been out of a job? 4. Why are you out of a job? Census takers are being carefully instructed that they are not to make any entries on the employment schedule for those who have retired, for those seeking their first jobs, or for married women who are keeping house and who are not now seriously trying to get jobs.

While the subject of old-age pensions is not as far advanced in the consciousness of Congress at present as that of unemployment, bills have been introduced which would allow the Federal government to cooperate on a fifty-fifty basis with individual states in encouraging legislation along this line, and they have been discussed.

## Pipe for Gaging Speed of Light

Physics

REFLECTING a beam of light back and forth on a ten-mile journey through a mile of iron pipe from which the air has been exhausted, in order to measure light's speed, seems to be feasible, preliminary experiments just completed at the Mt. Wilson Observatory have shown. The method was proposed by Dr. A. A. Michelson, famed physicist of the University of Chicago, who will go to Pasadena next spring for the final experiment.

Previous measurements by Dr. Michelson of the speed of light were made near Pasadena, California, by reflecting the light to a distant mountain peak and back, but uncertainties were introduced by the lack of knowledge of the condition of the air over the entire path. By using an evacuated pipe for the light path this difficulty is overcome.

In order to see whether a satisfactory image could be obtained, 1,100 feet of the pipe were laid, and preliminary tests made by F. G. Pease and E. C. Nichols, both of the Observatory staff. The light came from a narrow slit, and was made into a parallel beam by a concave mirror.

Thence the light passed to the other end of the pipe, where a flat mirror reflected it back. At the first end another flat mirror sent the light down the pipe again, and so it went back and forth, traveling, all told, about a mile. Finally, it reached a second concave mirror, which was intended to form an image of the slit.

When the pipe contained air at the same pressure as in the atmosphere, no image could be obtained. But when the air pumps were started and the air exhausted to about one-eighth of normal pressure, an image appeared. When a vacuum of about a thirtieth of ordinary pressure, or half a pound to the square inch, was reached, a clear and sharp image of the slit was seen. This shows that the method is practicable, and the rest of the mile of pipe, which is made of corrugated iron, with soldered joints, will be laid.

Prof. Michelson is now convalescing from an attack of pneumonia and will shortly go to Jamaica for a few months. He plans to go to Pasadena about the first of May, when the pipe will be finished and the final experiment can then be carried out.

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# Waterway Plan Proved in Miniature

## Model Testing May Help Solve Mississippi Problem

Engineering

ON a scaled model of the Des Moines River at Ottumwa, Iowa, hydraulic engineers of the state university at Iowa City have accurately determined the effect of cut off canals around bends near the city and have advised a building program that has actually proved itself in miniature.

This was very probably the first attempt in the United States to determine with models in advance of actual field construction the benefits to be derived from straightening rivers. It was very successful.

In Europe, however, the use of miniature river valleys in hydraulics laboratories is common and has proved very beneficial. Observations of the similarity between configurations of large streams and those of like small ones were first made by M. Dubuat, the Frenchman who also gave the world the basic theories of this branch of engineering. Frague made the initial practical application of the idea in 1875 when he helped Bordeaux improve the channel of the Garonne of that city. Ten years later Professor Osborne Reynolds, of England, studied with models the problem of a canal for seagoing vessels between Liverpool and Manchester.

Ottumwa, a city of 27,000, has suffered often from floods. There are two big bends in the river, one just above and one just below it, and at the end of the first bend the city owns a power plant supplied with water by a canal across the neck of the bend.

The city wanted to enlarge this canal to increase the capacity of the power plant and at the same time wanted to know what effect this enlarged canal and a second one across the other bend would have on the height of flood waters.

The model was constructed of concrete reproducing exactly an area of the river valley 8,000 feet wide and 33,600 feet long containing the two bends and a part of the city. A horizontal scale of one to 800 and a vertical scale of one to 100 was used. Water was run through the miniature river at different heights, with and without the proposed canals cut, and accurate measurements of water flow and heights were taken.

The recommendations made, which will doubtless save Ottumwa both money and time, call for the construction of the two canals not more than 400 feet wide and as deep as the

river, and for the removal of a number of levees.

Pending expected legislative action by the present congress, two governmental hydraulic laboratories will be built; one by the U. S. Bureau of Standards, the other by the Board of Army Engineers.

These laboratories are to be devoted to closer study of river improvement and similar projects for which Uncle Sam spends his money. Very probably they will contain facilities for modeling and testing proposed waterways plans.

While congress is providing better laboratory methods for proving flood control measures before they are applied in the field, the administration has halted the spending of the authorized \$325,000,000 on the much-discussed Jadwin project of controlling the Mississippi. The halt comes so the legislature can do something about the troubles that have arisen.

Some work had actually been stopped by court action of owners of lands situated in proposed spillways. Then non-approval of the Jadwin plan by prominent engineers became more

pronounced at the annual meeting of the American Engineering Council in Washington recently.

Senator Frazier, North Dakota, wants a committee of nine, six of whom would be civilian engineers, to report promptly to the Senate on all plans now being considered. Civilian engineers declare that it would be impossible to give an adequate report during the present session.

Senator Hawes, of Missouri, is expected to introduce soon a modified resolution that will be more practicable in the eyes of the engineers.

And as the legislators consider how to tame him, the Father of Waters rises. He has been urged upward by excessive water coming from the Ohio and Arkansas river basins where flooding has occurred. Levees along the Wabash river and some on the lower Mississippi have broken. Much land has been flooded and highway traffic interrupted.

Little damage was done along the Mississippi, however, because the surplus water came from only a small part of its great basin.

*Science News-Letter, January 25, 1930*

## Decline of Pueblos Mysterious

Archaeology

The Pueblo Indians, who were the most substantial residents of the Southwest for many centuries before the white man's era, were at the height of their development about the time of the Middle Ages, and their decline was sudden and mysterious, Earl H. Morris, archaeologist of the Carnegie Institution of Washington, said in an address at the Institution.

During the Golden Age of Pueblo culture were built the great community houses which stand today in impressive ruins in the southwestern states. In these oldest American apartment houses thousands of people lived. The pueblos, as the settlements are called, were located for security against wandering tribes and for their nearness to water supplies and land suitable for farming. The inhabitants produced artistic and unusual pottery.

This Indian culture came very suddenly into flower after a long period of slow growth, Mr. Morris concludes. The most plausible explanation is that nomadic tribes became menacing to the scattered farming

Pueblos, and caused the settled people to gather for strength in dwellings that were literal fortresses. Ideas of efficient tribal organization were established, for the great irrigation systems and the building programs would have been possible only by consistent, cooperative effort.

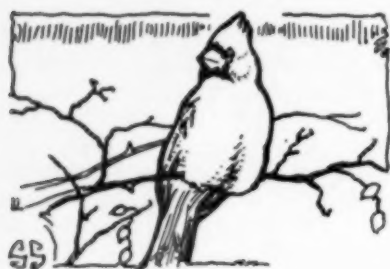
It would seem that this tremendous expansion and building came to an abrupt termination, Mr. Morris declared. The latest timbers from the prehistoric sites in widely scattered localities of the San Juan region have been examined by Dr. A. E. Douglass, of the University of Arizona, and he has found that these trees were cut in the same year. No evidence of building activity later than this has been found. Whether drought, pestilence, or warfare put an end to the progress of these communities is one of the problems still to be solved by archaeology. At the time the Spaniards arrived in the West the Pueblo Golden Age was at an end, and many of the settlements were abandoned.

*Science News-Letter, January 25, 1930*



## NATURE RAMBLINGS

By Frank Thone



### Cardinal

Clad in the brightest red of a Prince of the Church, but maintaining a most un-ecclesiastical sprightliness, the cardinal is the most colorful and cheering of the birds that haunt the snow-filled woods. Normally wintering just a trifle to the south he comes up to visit northerners with gratifying frequency, and indeed is believed by some ornithologists to be slowly extending his permanent range into the North. In any case His Eminence in Feathers is most welcome.

The cardinal has a smooth liquid voice when he chooses to sing, and he occasionally does so even in the winter. But his cold-weather call is mainly a ringing, metallic, rather thin note, sounding a good deal as though some one were striking a long, slack wire with a light hammer. He repeats it a good many times: "T'sing-t'sing-t'sing-t'sing-t'sing!" His mate, like most female birds, is seldom heard from, but when she does sing she surprises one with a fine, soft, melodious song of her own—a most unusual thing in birds.

The cardinal belongs to the grosbeak family, as might be guessed from his thick stout bill, and like all grosbeaks he is a very valuable destroyer of vermin. Some of the worst of agricultural pests are his favorite dishes, and he is given a clean record so far as behavior toward crops is concerned.

*Science News-Letter, January 25, 1930*

Approximately 200 different tribes occupied the United States at the time of Columbus' voyage to America.

Government engineers are seeking to develop a lightweight concrete for floors of long-span bridges.

An air-cooling system like that used in theatres will be tried out on a steamship sailing between Egypt and Italy.

## If America Hadn't Been Discovered—Continued

high places they put their stone altars and later their impressive temples.

A great cone of earth covered with lava blocks is one of the notable features of Mexican antiquity. This mound, on which once stood an altar, was recognized for what it is only within the past decade, for it was hidden beneath grass and brush. Study of the figurines and pottery buried about the base and the layers of soil and lava that accumulated there have led to an estimate that the mound is several thousand years older than the Christian era. In other words, it appears that the Indians of Mexico were building ambitiously the great high places as far back as that. How old the mounds in the states may be is not even estimated.

Mr. Collins concludes that when this custom of building mounds surmounted by religious structures of stone or wood is found in two regions of America, among the tropical inhabitants and the scattered mound-building tribes of the states, and when you find that other Indian tribes had no such custom, the most likely explanation is that the practice was spread with the wandering of early, migratory tribes.

A further resemblance between the Mexican pyramids and the mounds found in the states is cited by this archaeologist, who says that some mounds in Florida and Georgia have long approaches leading up to them, and at the distant end of the approach there is sometimes a well or artificial lake. All of which closely resembles the plan of Mayan temples, most particularly the plan at the famous Temple of the Sacred Well as Chichen Itza.

In the Southwest, contact with the people farther south brought in to the Pueblo settlements ornaments and that most important innovation, corn. It is supposed that corn was first domesticated in the highlands of Mexico, by crossing of the plant *teocentli* with some unknown wild plant. With this important event, several thousand years before Christ, America became a cereal-growing country, with a standard crop to be planted, guarded, and harvested. Perhaps that early start with corn gave Mexico the opportunity to gain headway in its culture and partially explains its remarkable achievements in those early millenniums. The corn seed spread from tribe to tribe and in the course of time reached the northern limits capable of its growth—again the northward swing of progress.

When the white men reached America, they found the Mayas a broken race and the mound builders only a remnant of what they had been. The Eskimos in the far north had had their day of being fine artists and ambitious workers and had settled down to a lower artistic and economic level. Was the Indian world burnt out?

Mr. Collins suggests that the Iroquois in the northeast were likely candidates to carry on the heritage. The Iroquois appear to have worked their way northward from the southeastern United States, for they show many similarities to southern customs and until recent times were represented in the south by the Cherokee, who spoke a related language. Like the Mayas and Aztecs, the Iroquois had advanced conceptions of government and they could provide leaders: for, too late, they organized the Iroquois league of nations. They might, if given time, have become the barbarians of the northern fringe who would have taken up the culture and built on it.

But perhaps the time for the northern barbarians to become important was a good way off in America when the white discoverers abruptly ended the drama. Before the Iroquois could become so powerful, the Aztecs might have been expected to salvage more of the Mayan culture and to organize their subject tribes for more ambitious conquest. And in South America, the Incas of Peru meanwhile had built up to its height an organization of many tribes which might conceivably have become a continental force if time and circumstances had allowed them to spread. Aztecs, Incas, Iroquois, if they had met in friendly trade or in battle there would have been stirring events ahead for America.

The migrations and the ups and downs of these prehistoric Americans are not merely of interest to us Americans today, in Dr. Kidder's opinion, but they are of practical concern to us. The great problem of history, he explains, is to understand the cycles through which races pass. If we could trace the causes which brought Greece and Rome up to power and then down to destruction, or if we could trace the simpler, clearer cycle of birth, growth, and decline of the Mayas or the Pueblos in America, Americans might better stave off the period of failure which American civilization may expect some day to face.

*Science News-Letter, January 25, 1930*





All round you they are, "close by, disregarded, quite at hand," as Conrad once exclaimed—yet by force of circumstance, you travel the one small path that years of usage have worn through this labyrinth.

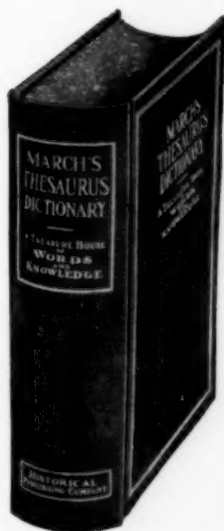
How often you have sought to leave this path—to find a new word for that trite expression, to clothe your thought in terms that clearly express your meaning—to avoid constant needless repetition. Your dictionary cannot help you here—you must first know the words you are seeking.

How to find those words you have forgotten—or perchance, are not familiar with! And how to recognize them!

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# FIRST GLANCES AT NEW BOOKS

**NATURE NARRATIVES**—Austin H. Clark—*Williams and Wilkins* (\$1). Mr. Clark, one of the most versatile of all American zoologists, gives us here a most appetizing platter of natural history *hors d'oeuvres*: butterflies, fishes, sea-lilies, stegosaurs and diatoms, spiced with little-known or often ignored facts about them. Since the title page bears the promissory inscription, "Volume I," we may infer that more little books like this may be expected soon. They will be welcome.

*Natural History*  
*Science News-Letter*, January 25, 1930

**THE MAKING OF CHEMISTRY**—Benjamin Harrow—*John Day* (\$2). A history of chemistry written for the layman, each chapter built around the personality of some great chemist.

*Chemistry*  
*Science News-Letter*, January 25, 1930

**MARKET DATA HANDBOOK OF UNITED STATES**—Paul W. Stewart—*Domestic Commerce Division* (\$2.50). In these days of modern business, statistical information is the foundation of economical marketing and sales operation. Uncle Sam in his capacity of statistician in this volume displays for industry a part of the purchasing power of the nation.

*Economics*  
*Science News-Letter*, January 25, 1930

**THE MOHAVE DESERT REGION, CALIFORNIA**—David G. Thompson—*U. S. Government Printing Office* (\$2). The Mohave Desert has always been a region of romance and mystery to the public at large, and to the geologist and geographer the romance and the mystery have been heightened rather than diminished by the many scientific problems offered by this particular sector of the "Great American Desert." In bringing forth this comprehensive reconnaissance of the geography, geology and hydrography of the Mohave, Dr. Thompson has not broken the spell, for though it answers some of the questions well, it blocks out still more problems which may still be worked.

*Geology*  
*Science News-Letter*, January 25, 1930

**A STUDY OF THE TOOTH-BILLED RED TANAGER, *PIRANGA FLAVA***—John T. Zimmer—*Field Museum*. Of interest to students of ornithology.

*Ornithology*  
*Science News-Letter*, January 25, 1930

**TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA: SECTION IV: GEOLOGICAL SCIENCES, INCLUDING MINERALOGY**—*Royal Society of Canada, Ottawa*. Contains a number of papers on Canadian geology, led by an essay on The Educational Function of the Geological Sciences by R. C. Wallace, F. R. S. C.

*Geology*  
*Science News-Letter*, January 25, 1930

**THE CORN BORER IN CENTRAL EUROPE**—K. W. Babcock and A. M. Vance—*U. S. Government Printing Office* (20c.). This study of the latest major grain pest to invade our country as it lives in its original home will be of use and interest not only to the technical workers engaged in the corn-borer fight but also to teachers and students who must eventually become participants in the warfare as the borer extends its operations.

*Entomology*  
*Science News-Letter*, January 25, 1930

**THE SUMMER BIRDS OF THE NORTHERN ADIRONDACK MOUNTAINS**—Aretas A. Saunders—*Roosevelt Wild Life Forest Experiment Station* (\$1). This issue of the Roosevelt Wild Life Bulletin (vol. 5, No. 3) will be of interest and use not only to the professional zoologist but to the nature-loving many whose good judgment and good fortune take them into the northern Adirondacks for their vacations. An interesting appendix to this book is a reprinting of a catalog of the birds of the region, by Theodore Roosevelt, Jr., and H. D. Minot, first published in 1877.

*Ornithology*  
*Science News-Letter*, January 25, 1930

**PROCEEDINGS AND TRANSACTIONS OF THE FOURTH INTERNATIONAL CONGRESS OF ENTOMOLOGY**—Edited by K. Jordan and W. Horn—*Gottfr. Pätz, Naumburg a/Saale, Germany* (\$20). The scientific records of this, the first international congress of entomology to be held in the United States, are to appear in two volumes, of which vol. II (Transactions) has now been completed. This volume collects the important papers which were presented at Ithaca in 1928, the title page listing 148. The set when completed will, of course, be a necessity for all entomological libraries that attempt completeness.

*Entomology*  
*Science News-Letter*, January 25, 1930

**POPULAR RESEARCH NARRATIVES, Vol. III—Engineering Foundation—Williams and Wilkins** (\$1). These brief stories of research, invention and discovery, of which this is the third volume, constitute an authentic and interesting chronicle of the progress of applied science. Written in the simple language by the men who have brought about the industrial and scientific progress they describe, their publication is one of the many useful activities of the Engineering Foundation.

*General Science*  
*Science News-Letter*, January 25, 1930

**KEY-CATALOGUE OF PARASITES REPORTED FOR PRIMATES (MONKEYS AND LEMURS) WITH THEIR POSSIBLE PUBLIC HEALTH IMPORTANCE, AND KEY-CATALOGUE OF PRIMATES FOR WHICH PARASITES ARE REPORTED**—C. W. Stiles, Albert Hassall and Mabelle Orleman Nolan—*U. S. Government Printing Office* (35c.). Our lesser cousins on the other side of the cage bars share our itches and ailments to the same extent that they share our ultimate physical ancestry; it is for this reason that they are favored above the cheaper dog and the more prolific guinea pig for really critical experiments. In getting together between the covers of one compact pamphlet a complete list of all primate-infesting parasites from insects down to bacteria, together with an equally complete list of the animals they infest, this group of workers in the U. S. Public Health Service have performed a distinct service to all their colleagues in the medical and physiological fields.

*Parasitology—Mammalogy*  
*Science News-Letter*, January 25, 1930

**A REMARKABLE GROUND SLOTH**—Richard Swann Lull—*Yale University Press* (\$1). A detailed account of the finding of the completely preserved *Nothrotherium* skeleton which was more than a nine-days' wonder in the public prints a few months ago, together with a description of the specimen, well illustrated with photographic plates of details and of a restoration of the animal by Professor Lull.

*Paleontology*  
*Science News-Letter*, January 25, 1930

**CHECK LIST OF THE PLEUROCARPUS MOSSES OF NORTH AMERICA NORTH OF MEXICO**—A. J. Grout—*Grout, 1 Vine St., New Brighton, New York* (25c.). A little vest-pocket size pamphlet which field botanists will find very handy to have along on field trips.

*Botany*  
*Science News-Letter*, January 25, 1930